

# Preliminary Report on the Surtsey Investigation in 1968. Terrestrial Invertebrates

By

CARL H. LINDROTH, HUGO ANDERSSON,  
HÖGNI BÖDVARSSON and  
SIGURDUR H. RICHTER

Zoological Institute, University, Lund, Sweden

The team, consisting of C. H. Lindroth, H. Andersson, H. Böldvarsson, and S. H. Richter, was the same as during the two preceding years.

The field-work was concentrated on the southern coast-land of Iceland, between Seljaland and Vík in Mýrdalur (June 22. to July 1.), and on the small Westman Islands.

Material was collected on Surtsey by Sigurdur Richter on the following days: July 10–12, July 30, August 14, August 28–29, 1968.

Fortunately a small helicopter from the Icelandic Coastguard was available on June 28, the only calm and sunny day of the entire period. In the course of 10 hours the following of the small Westman Islands were visited: Súlnasker, Sudurey, Brandur, Álfsey, Bjarnarey and Ellidaey. The results of collecting were remarkably good.

The vast material of terrestrial and limnic invertebrates collected in 1968 is under investigation by many specialists in different countries. The results are expected to be available by the end of 1969.

After that it is the intention to write and publish a detailed final report on our investigations and conclusions, describing the faunal development of Surtsey during the first five years of its existence. The plan is to have that report in print during the course of 1970.

No further field-work was carried out in 1969. It is, however, necessary, after the mechanism of dispersal of terrestrial organisms in the Surtsey area has now been fairly well investigated, to revisit Surtsey at even intervals in the future, every second or third summer, in order to follow the process of colonization.

## 1. SURTSEY

The previous winter had apparently been unusually hard. Sigurdur Richter reports that there were practically no carcasses on the shore and he was not able, though adults were collected, to find a single larva or live puparium of the fly *Leria borealis (modesta)* which, in 1967, had been breeding abundantly and was the predominant insect on the island. Most insects were found on the glue traps.

*Additions to the Surtsey list of Terrestrial Arthropods.*

(Only species not previously reported.)

### *Diptera.*

Fam. Tipulidae (det. B. Tjeder)

*Tipula marmorata* Meig. 17.VIII.68, ♀.

Fam. Mycetophilidae (det. R. Tuomikoski)

*Exechia nigra* Edw. 1967.

Fam. Simuliidae

*Gen. sp.* VIII.68.

Fam. Dolichopodidae (det. H. Andersson)

*Syntormon pallipes* F. 16.VIII.68, ♂ on glue trap.

Fam. Phoridae (det. C. N. Colyer)

*Megaselia pumila* Meig. 13.VI.67, ♀.

Fam. Muscidae s.l. (det. M. Ackland)

*Pegohylemyia ? nuoljensis* Ringd. 12.VIII.67, ♀.

*Nupedia infirma* Meig. 30.VI., 1.VII.67.

### *Hemiptera.*

Fam. Aphidae (det. F. Ossiannilsson)

*Euceraphis punctipennis* Zett. (*betulae* auct.) II. VII.68.

Total number of species

found on Surtsey:

Insects, 64 spp. Terrestrial Arthropods, 71 spp.

TABLE I

*Distribution of Coleoptera on the small Westman Islands*  
(Revised and enlarged from the report for 1967.)

Two species included in the 1967 report (*Hyroporus nigrita* and *Philonthus trossulus* were apparently mislabeled and are now excluded).

1. column (wing condition): m = macropterous (long-winged); b = brachypterous (short-winged); d = dimorphic (both wing forms occurring in the species).

2. & 3. columns: the figures (1–19) indicate the rank of abundance of the commonest species in South Iceland and on Heimaey, respectively.

	Wings	S. Iceland	Heimaey	Ellidaey	Bjarnarey	Sudurey	Álfsey	Brandur	Hellisey	Stúlasker	Geirfuglasker	Surtsey
<i>Carabidae</i>												
<i>Amara quenseli</i> Schnh. ....	d	15	1	—	—	—	—	11	2	6	—	1
<i>Calathus melanocephalus</i> L. ....	b	3	2	18	34	14	22	61	16	62	—	—
<i>Nebria gyllenhali</i> Schnh. ....	b	4	4	33	28	20	41	4	2	4	—	—
<i>Notiophilus biguttatus</i> F. ....	d	11	15	4	9	—	7	—	—	—	—	—
<i>Patrobus septentrionis</i> Dej. ....	m	14	+	7	18	37	11	1	—	12	—	(1)
<i>Trichocellus cognatus</i> Gyll. ....	m	+	12	—	—	—	—	1	—	9	—	—
<i>Hydrophilidae</i>												
<i>Cercyon melanocephalus</i> L. ....	m	+	+	1	—	—	—	—	—	—	—	—
<i>Staphylinidae</i>												
<i>Atheta amicula</i> Steph. ....	m	+	5	1	—	20	5	—	—	—	—	—
<i>A. atramentaria</i> Gyll. ....	m	13	3	4	1	15	4	—	—	—	—	4
<i>A. excellens</i> Kr. ....	m	17	+	11	1	—	1	5	—	4	—	—
<i>A. fungi</i> Gr. ....	m	+	+	2	7	13	2	—	—	—	—	—
<i>A. graminicola</i> Gr. ....	m	+	+	—	—	—	1	—	—	—	—	—
<i>A. islandica</i> Kr. ....	m	+	+	—	1	4	2	—	—	—	—	—
<i>A. melanocera</i> Thoms. ....	m	+	+	—	2	—	—	—	—	—	—	—
<i>A. vestita</i> Gr. ....	m	+	14	—	—	—	4	—	6	57	74	—
<i>Lesteva longelytrata</i> Gze. ....	b	12	16	2	3	1	2	5	—	2	—	—
<i>Micralymma marinum</i> Ström ....	b	—	+	—	—	—	—	—	—	—	5	—
<i>Omalius excavatum</i> Steph. ....	m	+	+	3	2	1	1	2	—	—	—	—
<i>O. rivulare</i> Gyll. ....	m	—	+	—	3	1	—	—	—	—	—	—
<i>Othius melanocephalus</i> Gr. ....	b	8	10	16	6	1	6	2	—	—	—	—
<i>Oxyroda haemorrhoea</i> Mnh. ....	m	+	+	—	—	2	3	—	—	—	2	—
<i>O. islandica</i> Kr. ....	b	+	19	1	—	—	—	—	—	—	—	—
<i>Quedius fulvicollis</i> Steph. ....	m	+	—	—	1	—	—	—	—	—	—	—

	Wings	S. Iceland	Heimaey	Ellidáey	Bjarnarey	Sudurey	Álfsey	Brandur	Hellisey	Súlnasker	Geirfuglasker	Surtsey
<i>Q. mesomelinus</i> Mrsh. ....	m	+	+	—	2	—	—	—	—	—	—	—
<i>Sipalia circellaris</i> Gr. ....	b	7	13	—	1	4	1	—	—	—	—	—
<i>Elateridae</i>												
<i>Hypnoidus riparius</i> F. ....	b	1	7	7	6	2	5	—	—	—	—	—
<i>Byrrhidae</i>												
<i>Byrrhus fasciatus</i> Forst. ....	m	+	+	2	2	—	—	—	—	—	—	—
<i>Cryptophagidae</i>												
<i>Atomaria analis</i> Er. ....	b	+	+	4	—	—	4	—	—	—	—	—
<i>Lathridiidae</i>												
<i>Enicmus minutus</i> L. ....	m	+	+	—	4	—	—	—	—	—	—	—
<i>Scarabaeidae</i>												
<i>Aphodius lapponum</i> Gyll. ....	m	+	+	13	1	—	—	—	—	—	—	—
<i>Curculionidae</i>												
<i>Barynotus squamosus</i> Germ. ....	b	10	11	4	6	6	—	—	—	—	—	—
<i>Ceuthorrhynchus constrictus</i> Mrsh. ....	d	+	—	—	—	5	—	—	—	—	—	—
<i>Otiorrhynchus arcticus</i> O. Fbr. ....	b	9	6	10	6	3	7	25	21	72	—	—
<i>O. dubius</i> Ström. ....	b	+	+	—	3	11	2	—	—	—	—	—
Number of species .....		70	71	19	23	18	20	10	5	10	2	2
Number of specimens .....		2038	1739	143	148	160	131	117	47	230	79	5

Total number of species: 34.  
Total number of specimens: 1060.

*Note to Table I.* It is interesting to observe that no less than half of the island species (17 of 34) are among the most abundant on Heimaey and/or the southern mainland of Iceland and that the majority of these (11 species) are brachypterous or dimorphic (with short-winged form occurring on the islands). Among the 17 less abundant species, of which 8 have been found on one of the small islands only, 14 are macropterous. Apparently chance dispersal and temporary colonization are most frequent among flying insects.

Carl H. Lindroth

TABLE II

## Distribution of certain families of Diptera on the Westman Islands

The figures indicate the number of specimens in our collections.

No Diptera have been collected on Brandur and Hellisey.

Some species are not to be expected as permanent inhabitants of the small Westman Islands due to absence of suitable biotopes. They are denoted: o = species living on level sea-shore with sand and sea-weed deposits, ø = species living in permanent wet localities such as mires, streams and ponds.

	S. Iceland	Heimaey	Elfidacy	Bjarnarey	Suturcy	Álfsey	Brandur	Hellisey	Súlnasker	Geirfuglasker	Surtsey
<i>Bibionidae</i>											
<i>Dilophus femoratus</i> Meig. ....	725	756	—	33	6	—			—	—	6
<i>Biblio nigriventris</i> Hal. ....	21	40	—	—	—	—			—	—	—
<i>Scatopsidae</i>											
<i>Scatopse notata</i> L. ....	14	72	—	48	29	3			—	—	1
<i>Empididae</i>											
<i>Chersodromia arenaria</i> Hal. ....	—	55	o	o	o	o			o	o	—
<i>Clinocera stagnalis</i> Hal. ....	163	3	—	—	—	—			—	—	—
<i>Rhamphomyia simplex</i> Zett. ....	29	86	ø	ø	ø	ø			ø	ø	—
<i>Dolichopodidae</i>											
<i>Dolichopus plumipes</i> Scop. ....	123	230	1	—	—	—			—	—	—
<i>Syntormon pallipes</i> Fabr. ....	89	11	ø	ø	ø	ø			ø	ø	1
<i>Campsicnemus armatus</i> Zett. ....	27	10	—	1	—	—			—	—	—
<i>Lonchopteridae</i>											
<i>Lonchoptera furcata</i> Fall. ....	214	115	—	45	9	7			—	—	—
<i>Sciomyzidae</i>											
<i>Pherbellia grisescens</i> Meig. ....	—	1	ø	ø	ø	ø			ø	ø	—
<i>Tetanocera robusta</i> Loew ....	1	1	ø	ø	ø	ø			ø	ø	—
<i>Sepsidae</i>											
<i>Orygma luctuosum</i> Meig. ....	—	9	o	o	o	o			o	o	—
<i>Piophilidae</i>											
<i>Piophila vulgaris</i> Fall. ....	16	661	2	1	3	2			9	—	1
<i>P. lundbecki</i> Duda ....	—	6	—	—	—	—			—	—	—
<i>Chamaemyiidae</i>											
<i>Chamaemyia geniculata</i> Zett. ....	10	148	—	5	8	—			—	—	—
<i>Coelopidae</i>											
<i>Coelopa frigida</i> Fabr. ....	1	116	—	—	—	2			—	1	244
<i>Helcomyzidae</i>											
<i>Heterocheila buccata</i> Fall. ....	6	20	—	—	—	—			—	—	30
<i>Heleomyzidae</i>											
<i>Neoleria prominens</i> Beck. ( <i>septentrionalis</i> Coll.) ..	8	428	7	42	2	42			—	—	—
<i>Tephrochlaena oraria</i> Coll. ....	23	—	—	—	—	—			—	—	34
<i>Heleomyza serrata</i> L. ....	46	16	—	—	—	1			—	—	116
<i>H. borealis</i> Boh. ( <i>modesta</i> Meig.) ....	4	159	13	1	18	23			—	1	736
<i>Ephydriidae</i>											
<i>Discocerina bohemani</i> Beck. ....	13	4	ø	ø	ø	ø			ø	ø	—

	S. Iceland	Heimaey	Ellidaey	Bjarnarey	Sudurey	Álfsey	Brandur	Hellisey	Súlnasker	Geirfuglasker	Surtsey
<i>Philygria vittipennis</i> Zett. ....	3	28	—	—	—	—			—	—	—
<i>Hydrellia griseola</i> Fall. ....	317	378	33	9	2	83			—	—	—
<i>Scatella paludum</i> Meig. ....	26	226	—	—	—	—			—	—	—
<i>S. tenuicosta</i> Coll. ....	140	20	—	—	—	4			—	—	—
<i>S. sibilans</i> Hal. ....	175	191	2	2	2	310			8	—	—
<i>Limnellia</i> sp. ....	4	5	—	—	1	—			—	—	—
<i>Drosophilidae</i>											
<i>Scaptomyza graminum</i> Fall. ....	239	179	3	13	3	8			—	3	—
<i>Parascaptomyza pallida</i> Zett. ....	50	33	1	2	—	4			—	—	—
<i>Drosophila funebris</i> Fabr. ....	8	76	—	—	—	1			—	—	3
<i>Milichiidae</i>											
<i>Meoneura obscurella</i> Fall. ....	—	1	—	—	—	—			—	—	—
<i>M. lamellata</i> Coll. ....	2	8	—	—	—	1			—	—	—
<i>Scatophagidae</i>											
<i>Scatophaga furcata</i> Say ....	15	14	—	—	—	—			—	—	2
<i>S. stercoraria</i> L. ....	93	138	4	1	—	4			—	—	44
<i>S. villipes</i> Zett. ....	—	2	0	0	0	0			0	0	—
<i>S. litorea</i> Fall. ....	9	88	7	62	247	147			29	1	1
<i>Ceratinostoma ostiorum</i> Hal. ....	—	30	0	0	0	0			0	0	—
<i>Chaetosa punctipes</i> Meig. ....	—	1	0	0	0	0			0	0	—
<i>Calliphoridae</i>											
<i>Protophormia terraenovae</i> R.-D. ....	5	4	—	—	1	1			—	—	3
<i>Calliphora uralensis</i> Vill. ....	5	46	—	3	2	—			—	—	1
<i>C. vicina</i> R.-D. ( <i>erythrocephala</i> Mg.) ....	1	12	—	—	—	—			—	—	5
<i>Cynomya mortuorum</i> L. ....	3	29	3	2	19	2			9	—	1
Number of species ....	36	43	11	16	15	18			4	4	17
Number of specimens ....	2628	4456	76	270	352	645			55	6	1226

Small islands: Total number of species: 29

Total number of specimens: 2630

*Note to Table II.* When the 10\* denoted species are excluded 31 species were found on South Iceland and 33 on Heimaey which also could be expected on the small islands. Only one of them is not found on Heimaey and 23 (68%) are represented from at least one small island. During only five years of rather limited collecting as much as 16 (47%) have been recorded on Surtsey. These figures indicate that the actual distances do not constitute any barrier of importance to the dispersal of flying Diptera between Heimaey and the small islands. Differences in species composition and abundance must be due to ecological differences.

Hugo Andersson

\* A figure that probably would have been higher if the ecological demands of all species were completely known.

TABLE III

Distribution of Collembola on the small Westman Islands  
(Quantitative figures not yet available.)

	Heimaey	Elldæy	Bjarnarey	Sudurey	Álfsey	Brandur	Hellisey	Súmasker	Geirfluglasker	Surtsey
<i>Anurida immsiana</i> Bagn. ....	+	+	-	+	-	-	-	-	+	-
<i>Archisotoma besselsi</i> Pack. ....	+	-	-	-	-	-	-	-	-	+
<i>Folsomia fimetaria</i> L. ....	+	-	-	-	-	-	-	-	+	-
<i>F. quadrioculata</i> Tullb. ....	+	-	+	+	+	+	-	+	-	-
<i>Friesca claviseta</i> Axels. ....	-	-	-	-	-	-	-	+	-	-
<i>F. mirabilis</i> Tullb. ....	+	-	-	+	-	-	-	-	-	-
<i>Hypogastrura denticulata</i> Bagn. ....	+	+	+	+	+	+	-	-	-	-
<i>H. purpurascens</i> Lubbo. ....	+	-	+	+	+	+	+	+	-	-
<i>Isotoma maritima</i> Tullb. ....	+	-	-	-	-	-	-	-	+	+
<i>I. notabilis</i> Schäff. ....	+	-	-	+	-	-	-	-	-	-
<i>I. violacea</i> Tullb. ....	+	+	+	-	-	-	-	-	-	-
<i>I. viridis</i> Bourl. ....	+	+	+	+	+	+	+	+	-	-
<i>Isotomiella minor</i> Schäff. ....	+	+	+	-	-	-	-	-	-	-
<i>Lepidocyrtus cyaneus</i> Tullb. ....	+	-	-	-	+	-	-	-	-	-
<i>L. lanuginosus</i> Gmel. ....	+	-	+	+	+	+	+	-	-	-
<i>Micranurida pygmaea</i> Börn. ....	-	+	-	-	-	-	-	-	-	-
<i>Onychiurus armatus</i> Tullb. s.l. ....	+	+	-	+	+	-	-	+	+	-
<i>O. duplopunctatus</i> Strenzke ....	-	-	-	-	-	-	-	-	+	+
<i>Sminthurides pumilis</i> Krausb. ....	+	-	-	-	-	+	-	-	-	-
<i>Sminthurinus aureus</i> Lubbo. ....	+	-	+	+	-	+	-	-	-	-
<i>Tetracanthella arctica</i> Cassagn. ....	+	+	-	+	+	-	-	-	-	-
<i>Tullbergia krausbaueri</i> Börn. ....	+	-	+	-	-	-	-	-	-	-
<i>Xenylla humicola</i> O. Fabr. ....	-	-	-	+	+	+	-	+	-	-
Number of species		8	9	12	9	8	3	6	5	3

Total: 23 species.

Högni Bødvarsson

## 2. THE SMALL WESTMAN ISLANDS

In the report for 1967, a preliminary account was given (Table I) of the species of *Coleoptera* found on the small islands, most of them collected by Sigurdur Richter in 1966, on Ellidaey by Lindroth and Andersson in 1965, on Geirfugla-sker and Súlnasker by all in 1967. Intense collecting on six of the islands by the aid of a helicopter was made on June 28, 1968. It is now possible to include also Sudurey in the comparison, as well as insect orders other than *Coleoptera*.

## 3. THE SOUTHERN MAINLAND OF ICELAND

A full report of the collected material has to be postponed until all groups have been identified by specialists. At this time only the unexpected discovery of the terrestrial Turbellarian worm *Rhynchodemus terrestris* O. E. Müll. (det. T. G. Karling) on several localities between Seljaland and Pétursey should be mentioned.

## 4. EXPERIMENT ILLUSTRATING HYDROCHOROUS TRANSPORT OF TERRESTRIAL INVERTEBRATES

The high percentage of — constantly or individually — flightless insects on the small Westman Islands suggests that hydrochorous dispersal has been important. It seemed that grass-tufts and pieces of sod dropping directly into the sea from the steep walls of the everywhere present bird cliffs would present the best opportunity for *in situ* transport of the terricolous fauna, provided these pieces of vegetated soil actually float on the water surface.

On Súlnasker an extreme development of a phenomenon known also from the other islands was observed: the occurrence of high, isolated peat tussocks with *Festuca rubra* on top, standing close together but separated by channels of bare soil. According to Dr. Sturla Fridriksson this formation has developed as a result of collapsed burrows of *Fraterecula arctica*. The tussocks were so loosely attached to the ground that they easily broke off at the base. Two of them were collected (height about 40 cm, weight about

7 kg each) and brought to the institute in Lund for experiments.

Tussock I was submerged into a big glass jar filled with salt-water (35 pro mille NaCl) where it was able to float freely, with only a couple of centimeters projecting above surface. Tussock II was used for control. 40 specimens of the weevil *Otiorrhynchus arcticus* and 8 of the ground-beetle *Calathus melanocephalus* (both living on Súlnasker) were transferred to tussock I before the salt-water exposure, which lasted for one week. Its content of live animals was then extracted through Berlese funnels.

As a preliminary result of the experiment it should be mentioned that 4 individuals of *Otiorrhynchus arcticus* and 1 of *Calathus melanocephalus* survived the exposure and, from the original inhabitants of the tussock, 1 specimen of the ground-beetle *Amara quenseli* as well as several Collembola and Acarids (mites). The investigation of tussock II, not treated in salt water, demonstrated that only a small fraction of the original fauna had survived the exposure of tussock I. Though it is fully realised that a floating tussock in open sea is subject to far more severe conditions through the influence of wind and waves, the experiment seems to show that a submersion in sea-water *in itself*, even for as long as one week, is not fatal to all inhabitants of a big tussock. It is therefore felt that this is an important means of dispersal within this part of the North Atlantic, at least over moderate distances.

It is also relevant to refer to our experiment with plastic grains described in the report for 1967, according to which hydrochorous surface transport from Heimaey to Surtsey (about 20 km), also under adverse wind condition, took place in the course of one week. This was the reason for selecting this period of time for the tussock experiment.

## ACKNOWLEDGEMENT

This work was sponsored by the Surtsey Research Society with a grant from the U.S. Atomic Energy Commission, Environmental Branch, under contract No. AT (30-1)-3549.